

Study on Stabilizing the Laser Frequency in 10^{-14} Level by Optimizing Modulation Transfer Spectroscopy on the 87Rb D2 Line

In this study, we present a high-performance laser frequency stabilization method that utilizes modulation transfer spectroscopy (MTS) on the rubidium 87 D₂ transition line. The frequency instability is evaluated with beating signal of two frequency-locked external cavity diode lasers (ECDL), and reached a short-term stability of $4.5 \times 10^{-14} / \sqrt{\tau}$ and did not exceed 2×10^{-12} until 10^5 s. To the best of our knowledge, this is the best performance reported with the rubidium 87 D₂ transition.

Author: LEE, SangLok (Korea Research Institute of Standards and Science)

Co-authors: Prof. MOON, Geol (Chonnam National University); Dr PARK, Sang Eon (Korea Research Institute of Standards and Science); HONG, Hyun-Gue (Korea Research Institute of Standards and Science); LEE, Jae Hoon (Korea Research Institute of Standards and Science); Dr SEO, Sangwon (Korea Research Institute of Standards and Science); Dr KWON, Taeg Young (Korea Research Institute of Standards and Science); Dr LEE, Sang-Bum (Korea Research Institute of Standards and Science)

Presenter: LEE, SangLok (Korea Research Institute of Standards and Science)

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